

REMARKS

Claims 30, 43, 48 and 49 have been amended. Claims 30-44, 46 and 48-49 remain pending. Applicant reserves the right to pursue the original claims and other claims in this and other applications. Please reconsider the above-referenced application in light of the amendments and foregoing remarks.

The Amendments filed on December 28, 2004 and July 12, 2005 are objected to under 35 U.S.C. § 132 (new matter). The objection is respectfully traversed with regard to claims 30, 43 and 48. The Office Action asserts that "'without etching said substrate' is not specifically supported by the specification." (p. 2). Claims 30, 43 and 48 have been amended to obviate the Examiner's concerns. Specifically, claims 30 and 48 now recite, *inter alia*, that the "transparent substrate remains unpatterned." Claim 43 now recites, *inter alia*, an "unpatterned substrate."

In support of these claim amendments, Applicant respectfully directs the Examiner's attention to the embodiments illustrated in FIGS. 16A-16F, FIGS. 19A-19H, and the corresponding text for FIGS. 16A-16F and 19A-19H. For example, in FIG. 16C, photoresist mask 96a comprising a periodic grating pattern is formed *only* on birefringence layer 93. Then, the "unmasked portions of the birefringence layer 93 are removed by etching as shown in FIG. 16D." (Applicant's specification, pg. 59, line 24 through pg. 60, line 2). Mask 96a is then removed (FIG. 16E) and an isotropic overcoat layer 94 is formed.

As FIGS. 16A-16F illustrate, the transparent substrate 92 is *not* patterned *when the birefringence layer 93 is patterned with the periodic grating pattern* (FIG. 16D). Similarly, in FIGS. 19A-19H, the transparent substrate 92 is *not* patterned; but, *only the birefringence layer 93 is patterned* (FIG. 19G). As a result, Applicant's specification and

illustrations support the recited feature that the substrate remains unpatterned or is an unpatterned substrate. The drawings are part of the original disclosure.

Claims 30-42, 43-44, 46 and 48 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. The rejection is respectfully traversed. As indicated above, FIGS. 16A-16F, FIGS. 19A-19H, and the corresponding text for FIGS. 16A-16F and 19A-19H, support that transparent substrate 92 remains unpatterned when birefringence layer 93 is patterned with a periodic grating pattern.

Claims 43-46 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. The rejection is respectfully traversed. The Office Action asserts that the specification and claims fail to teach how the "incident reflection beam" of claim 43 is generated. Claim 43 recites that an "incident reflection beam [is received] from an optical disk," to clarify where the incident beam is generated. The beam is incident to the polarization hologram but is a reflection beam from the optical disk. Consequently, Applicant has labeled the incoming beam as an incident reflection beam to the polarization hologram. There is no dichotomy, as the Office Action asserts, when this claim language is viewed in light of Applicant's specification. The incident beam does *not* have to be transmitted if the Applicant's specification describes an incident reflection beam in a different manner.

For example, Applicant respectfully directs the Examiner's attention to Applicant's specification, pp. 48-65, and FIGS. 10-20C which describes various embodiments of a polarization hologram and its method of formation. In particular, page 51 teaches that, in FIG. 11, the birefringence layer 93, "has different refractive indexes for two orthogonal polarization directions of an incident beam which is the

reflection beam from the optical disk in the optical pickup apparatus.” (ll. 1-4) (emphasis added).

Accordingly, the “polarization hologram 90 diffracts the reflection beam in predetermined diffracting directions depending on the wavelength ($L1/L2$) of the incident reflection beam.” (Applicant’s specification, p. 51, ll. 6-9). In other words, the incident reflection beam is the reflection beam generated from the optical disk in the optical pickup apparatus. The light beam, *i.e.*, incident reflection beam, is affected by the polarization hologram 90, contrary to the Office Action.

For example, “[a]s shown in FIG. 12, the incident beam (e.g., the reflection beam from the optical disk) to the polarization hologram 90 has two orthogonal polarizing directions.” (Applicant’s specification, p. 52, ll. 16-19). As a result, the “incident beam is converted at the polarization hologram 90 into the 0-order diffracted ray (corresponding to the parallel polarizing directions) and the ± 1 -order diffracted rays (corresponding to the perpendicular polarizing directions). The 0-order diffracted rays travels in a straight line *through* the polarization hologram 90. The ± 1 -order diffracted rays are the diffracted reflection beams produced *at* the polarization hologram, which are diffracted in the predetermined diffraction directions to the photodetector 10b.” (Applicant’s specification, p. 51, l. 20 through p. 52, l. 9). A beam, which is incident to polarization hologram 90, is generated from the reflection from an optical disk. In other words, it is an incident reflection beam. Consequently, claims 43-46 are enabled by Applicant’s specification.

Claims 30-42 and 48 stand objected to because of informalities. The objections are respectfully traversed. Claim 30 has been amended to recite, *inter alia*, “an incident reflection beam received from an optical disk.” Claim 48 has been

amended to have proper antecedent basis and now recites "a reflection beam." Accordingly, the objections should be withdrawn.

Claims 30-32 and 35-42 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,739,952 ("Takeda I") in view of U.S. Patent No. 5,244,713 ("Nakamura") and U.S. Patent No. 5,793,733 ("Takeda II"). The rejection is respectfully traversed.

The Office Action employs *three* separate references in stating that claims 30-32 and 35-42 are obvious. Applicant respectfully submits, however, that the primary reference Takeda I does not disclose or suggest a method of forming a polarization hologram by "patterning *only* [a] uni-directionally stretched birefringence layer by forming a photoresist and mask on said birefringence layer, wherein said step of patterning forms a uni-directionally stretched birefringence layer with a periodic grating pattern, *wherein said transparent substrate remains unpatterned,*" as recited in claim 30 (emphasis added). Takeda I does not teach or suggest patterning *only* a birefringence layer, wherein the underlying substrate remains unpatterned.

Takeda I's glass substrate 1 *and* birefringent film 2 are *both* formed with a periodic grating pattern. In Takeda's FIGS. 1 and 2, the "surface of the glass *substrate* 1 is provided *with* a periodic pattern of ridges and grooves to form a [periodic] grating [pattern]." (Col. 6, ll. 1-2) (emphasis added). The "[r]idges 1a on the surface of the glass *substrate* 1 are coated with a thin birefringent film 2 which is formed of polydiacetylene." (Col. 6, ll. 2-4). Takeda's birefringent film 2 and substrate 1 are then *etched simultaneously* to form grooves 1a, 1b in glass substrate 1.

In contrast, Applicant's transparent substrate 92 remains unpatterned (FIGS. 16F and 19H). The birefringence layer 93 is *the only layer* formed with a periodic grating pattern. Applicant's transparent substrate 92 *does not* have a periodic grating pattern formed therein as Takeda I discloses. As such, Takeda I does not disclose or suggest the subject matter of claim 30.

The second reference, Nakamura, is relied upon for disclosing an organic polymer film that is heat-treated and then uniaxially stretched. The third reference, Takeda II, is relied upon for disclosing that a periodic grating pattern can be formed by placing a photoresist and mask on the birefringence layer. Nakamura and Takeda II add nothing to rectify the deficiencies associated with Takeda I. Namely, Takeda I does not disclose or suggest patterning *only* a birefringence layer, wherein the underlying substrate remains unpatterned. In fact, Takeda I specifically discloses that the transparent substrate and birefringence layer are *both* formed with a periodic grating pattern.

Claims 31-32 and 35-42 depend from claim 30, and should be allowable for at least the reasons provided above, and on their own merits.

The Office Action acknowledges that Nakamura discloses a heat-stretching process conducted at a temperature between 190 to 230°C (Office Action, p. 7); but, concludes that it would be an obvious modification to use a temperature of 350°C. Applicant respectfully submits that this is *not* the proper standard for setting forth a *prima facie* case of obviousness. See M.P.E.P. § 2144.05. Nakamura discloses a temperature that is *at least 120°C cooler* than Applicant's claimed temperature in forming the birefringence layer, *i.e.*, 350°C. There is no evidence that the temperatures are close enough that one skilled in the art would believe them to have the same properties. There is a significant difference in formation temperature in which the two

birefringence films are formed in. Further, Applicant's claimed temperature of 350°C does *not* lie within Nakamura's disclosed range. Accordingly, a *prima facie* case of obviousness has not been properly set forth.

The Office Action acknowledges that with regard to claims 37-39, the cited references "do not teach explicitly to have the particular values claimed in the claims." (Office Action, p. 8). Applicant respectfully submits that the cited references do not teach or disclose *any* refractive indices which are close to Applicant's cited refractive indices. Again, a *prima facie* case of obviousness has not been properly set forth. See M.P.E.P. § 2144.05.

The cited references do not disclose or suggest "a refractive index . . . in said one direction of stretching is about 1.62," as recited in claim 37. Moreover, claim 38 recites that "the refractive index for said organic polymer material in a direction *perpendicular* to said one direction of stretching is about 1.49." The cited references do *not* disclose or suggest the refractive index for a birefringent film in a perpendicular direction. These are additional reasons for the allowance of the dependent claims.

Claims 33-34 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Takeda I, Nakamura, Takeda II, and further in view of U.S. Patent No. 5,245,456 ("Yoshimi") and U.S. Patent No. 6,040,418 ("Yamamoto"). The rejection is respectfully traversed.

The Office Action employs *five* separate references in stating that claims 33-34 are obvious. Claim 33 depends from independent claim 30 and claim 34 depends from claim 33. For at least the reasons provided above regarding claim 30, claims 33 and 34 should be similarly allowable with claim 30 for at least the reasons provided above with regard to claim 30.

In particular, the three cited references: Takeda I, Nakamura, and Takeda II, do not teach or suggest patterning *only* a birefringence layer, wherein the underlying substrate remains unpatterned. In fact, Takeda I discloses that the transparent substrate and birefringence layer are *both* formed with a periodic grating pattern (FIGS. 1-2). The fourth reference, Yoshimi, and the fifth reference, Yamamoto, are relied upon for disclosing polyimide resin and acidic solutions. Both references, however, add nothing to rectify the deficiencies of Takeda, Nakamura, and Takeda II.

Claims 43-45 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Takeda I in view of Nakamura. The rejection is respectfully traversed.

At the outset, Applicant respectfully notes that claim 45 was canceled in the July 12, 2005 Amendment. In addition, for similar reasons provided above, the cited references do not disclose or suggest a polarization hologram comprising, *inter alia*, "an *unpatterned* substrate; [and] a uni-directionally stretched *birefringence layer with a periodic grating pattern* comprising organic polymer material *affixed to an unpatterned* substrate," as recited in claim 43 (emphasis added). Takeda I teaches that the transparent substrate *and* the birefringent film are *both* formed with a periodic grating pattern (FIGS. 1-2). Accordingly, the references do not disclose a polarization hologram with an unpatterned substrate or that the birefringence layer with a periodic grating pattern is affixed to an unpatterned substrate.

Moreover, since Takeda I discloses that the substrate *and* the birefringent film are *both* formed *with* a periodic grating patterned, the cited references *cannot* disclose that the depth of a periodic grating pattern is essentially equal to a thickness of a uni-directionally stretched birefringent layer. The depth of the grating pattern in Takeda I is much deeper than the thickness of the birefringent film since the transparent substrate is *also* formed *with* the periodic grating pattern (FIGS. 1-2). This is an

additional reason for the allowance of claim 43. Claim 44 depends from claim 43 and should be similarly allowable for at least these reasons, and on its own merits.

Claim 46 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Takeda I and Nakamura, and further in view of U.S. Patent No. 5,245,471 ("Iwatsuka"). The rejection is respectfully traversed. Claim 46 depends from claim 44, which depends from claim 43. For at least the reasons provided above regarding independent claim 43, claim 46 should be similarly allowable.

Claims 48 and 49 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Iwatsuka in view of Nakamura. The rejection is respectfully traversed. Claims 48 and 49 have been amended to recite a method of forming a polarization hologram comprising, *inter alia*, "forming a periodic grating pattern on [a] uni-directionally stretched organic polymer layer with [a] photoresist mask, *wherein a top surface portion of the substrate is exposed*; removing said photoresist mask; and *forming an isotropic overcoat over said patterned uni-directionally stretched organic polymer layer and on said exposed portion of the top surface of the substrate.*" (emphasis added).

Iwatsuka does not disclose or suggest exposing a top surface portion of the substrate *and* forming an isotropic overcoat over the exposed portion of the top surface. For instance, in FIGS. 2(A)-2(E), Iwatsuka teaches that a birefringence layer 2 is formed on glass substrate 1. A mask 3 is then formed on the birefringence layer 2 (FIG. 2(B)). The birefringence layer 2 is then etched using mask 3 (FIG. 2(C)). The birefringence layer 2 is *not* completely etched to expose a top portion of substrate 1. Next, an isotropic dielectric film 4 is formed over the birefringence layer 2; but, is *not* formed *on* the exposed portion of the top surface of the substrate (FIG. 2(E)). In fact, it is impossible for this step to occur since Iwatsuka does not disclose or suggest exposing a top surface of substrate 1. Nakamura is relied upon for disclosing a uniaxially

stretched birefringence film and adds nothing to rectify the deficiencies associated with Iwatsuka.

Further, claim 48 also recites that “the polarization hologram is configured to substantially satisfy the following requirements: $(n_p - n_1)h = mL$; $(n_s - n_1)h = (m \pm \frac{1}{2})L$; where n_p is a refractive index of the birefringence layer for a p-polarized light of the reflection beam, n_s is a refractive index of the birefringence layer for an s-polarized light of the reflection beam, n_1 is a refractive index of an isotropic overcoat layer, h is a depth of the periodic grating pattern, L is a wavelength of the reflection beam, and m is an integer ($m=0, \pm 1, \pm 2, \dots$).” Iwatsuka does not teach or suggest Applicant’s claimed relationship.

Iwatsuka teaches a polarizer that satisfies the computational relations set forth in column 4, lines 10-40. When the relations are satisfied, Iwatsuka discloses that “the incident-ray polarized light components indicating refractive indexes n_{1+} , n_{2+} interfere with each other for intensification as they pass through the polarizer, whereas the incident-ray polarized light components indicating refractive indexes n_{1-} , n_{2-} weaken each other by mutual interference as they pass through the polarizer.” (Col. 4, ll. 40-47). As a result, “[i]n the end, only the polarized light components in the + direction can be taken out.” (Col. 4, ll. 47-49). Applicant’s disclosed formulation *does not* take out the polarized light components in the +direction; but, rather, uses the parallel and perpendicular refractive indexes in combination to form the polarization hologram.

Moreover, there is no motivation to combine Iwatsuka and Nakamura to optimize the birefringence as the Office Action asserts. Iwatsuka specifically discloses that the polarizer must conform to the relations provided; and thus, there is no motivation to use a uniaxially stretched birefringence film to optimize birefringence.

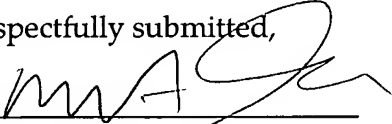
The optimized birefringence is already provided with Iwatsuka's specific computational formula.

Claims 43-44 and 46 stand rejected under the judicially created doctrine of obviousness type double-patenting as being unpatentable over claims 1-9 of U.S. Patent No. 6,618,344 ("Funato"). The rejection is respectfully traversed. Applicant respectfully submits that the claims of the present application recite important limitations that are not obvious over the claims of Funato. For instance, claim 1 of Funato recites an *optical pickup apparatus* with "a birefringence layer of a stretched organic polymer material." Claims 2-9 of Funato depend from claim 1.

Claim 43 of the present application, in contrast, defines a *polarization hologram* structure and recites "a uni-directionally stretched birefringence layer with a periodic grating pattern comprising organic polymer material affixed to said *unpatterned* substrate . . . wherein the depth of said periodic grating pattern is essentially equal to a thickness of said uni-directionally stretched birefringence layer." (emphasis added). Claim 1 of Funato does not disclose that the depth of the periodic grating pattern is essentially equal to a thickness of a uni-directionally stretched birefringence layer, much less an *unpatterned* substrate.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to review and pass this application to issue.

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